VIII. *An Essay on the Tracheæ or Windpipes of various Kinds of Birds.*
By John Latham, M. D. F. R. S. and L. S. Romfey.

Read July 4, October 3, and November 7, 1797.

THE study of Birds has for many years past occupied my attention ; and I might add, that from my earliest remembrance I have had a predilection in favour of this part of Natural History, although my researches have not been totally confined thereto. I have hereby been tempted to publish my volumes of Ornithology, which, I flatter myself, are now generally known to the world.

During my progress in the description of the external appearance of each, the criterion whereby most Ornithologists have thought it sufficient to discriminate one species from another, I have also paid some attention to the structure of the internal parts ; and, among other things, the difference in the formation of the *trachea* in many of the Duck genus, in particular, has not failed to strike my observation ; and that this circumstance will not a little contribute to assist our researches concerning the identity of several species, hitherto not a little confused, will hereafter be made to appear. But as I wished to get as much light thrown on the subject as possible ; I have postponed the publication of my observations, until by repeated dissections, and comparing many individuals with one another, I might be enabled to speak with the greater certainty. This matter has also required a much greater length of time in respect to the Duck genus, whose history will in this essay take up a material part
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of our attention, as it is only at particular seasons that some of them are to be met with, and several in mild winters do not visit this kingdom, except by seeming chance, or in very small numbers. It is not possible therefore that any person of himself, however advantageously situated, can hope to meet with a sufficient number of specimens, without the assistance of others. I speak this experimentally, as without such aid I should not have been able to have furnished matter for this essay.

Amongst the various friends to whom I am obliged in respect to this undertaking, the judicious and well-informed Naturalist, William Boys, Esq. of Deal, stands deservedly foremost, having rendered me very great assistance, not only by specimens, but by every observation in his power. I find myself greatly indebted to my friend Colonel Montagu, a most diligent observer of nature; also to Mr. Lamb, Surgeon, of Reading—all Fellows of this Society. Nor should I omit my valuable correspondent Dr. Bloch, of Berlin, who has rendered himself conspicuous by several essays on the present subject, as may be seen in the Berlin Transactions*. To which must be added the observations of Doctors Pallas†, Beckmann‡, Silberschlag§, and Otto||, contained in the same works, all of which may be read to advantage; for although these gentlemen do not altogether coincide in their opinions, yet as they all tend to the same point, such efforts in order to ascertain truth must always be useful—Not forgetting due acknowledgment to the valuable paper of the late Dr. Parsons, who, many years prior to the above, gave an account of the structure of the *asperæ arteriæ*, or windpipes, of several Birds, and in the Land.

* *Besch. der Berl. Nat. Fr.* iv. p. 579.—*Schrift. der Berl. Nat. Fr.* i. p. 51.

† *Besch. der Berl. Nat. Fr.* ii. p. 551.

‡ *Besch. der Berl. Nat. Fr.* i. p. 170.

§ *Schrift. der Berl. Nat. Fr.* i. p. 36.

|| *Besch. der Berl. Nat. Fr.* iii. p. 456.

Tortoise, in the Philosophical Transactions*. It is by means of the above resources, added to the observations I have myself made for a number of years, that I shall endeavour to elucidate the subject as far as in my power; and although I may not be able to determine the matter with so great a degree of precision as might be wished, it is more than probable that others, hereafter, will be able to complete the structure of which I have endeavoured to lay the groundwork.

I shall begin this essay by observing, that in most birds the natural shape of the *trachea*, *aspera arteria*, or *windpipe*, by all which names this part is known, is that of a regularly uniform cylinder of equal diameter, or nearly so, throughout, from its rise at the root of the tongue, to its entrance into the hollow of the *thorax*, *sternum*, or *breast-bone*, where it divides into two branches, called *bronchiæ*, which ramify into air-vessels which compose the two lobes of the lungs. This, I say, is the general mode of construction: but Ornithologists pretty far back† have noticed nature's deviation from this usual structure, both in respect to the various curvatures of the windpipe itself, as well as the difference of some from others in respect to conformation; but their sentiments were penned in too vague a manner to determine much thereon, not answering the purpose further than to stimulate our future researches. As far as the deviation from a cylindrical shape is concerned, it is observable that the peculiar difference in structure is seen only in the *male* sex, the *female* not having the least enlargement, or increased cavity, as will hereafter be mentioned: but to what purpose nature has intended this, is, I believe, at present unknown to us. Some authors have given as their opinion, that the enlargement of the *trachea* in males, whenever

* Vol. lvi. p. 204.

† Aldrovandus, Willughby.—See also Birch's Hist. Roy. Soc. ii. p. 13

it happens, serves to increase the tone of voice; and that this sex is enabled, by means of it, to cry out more forcibly than those birds which have no such construction of parts—an instance of which is pointed out in the *Golden-Eye Duck*, the Latin name of which (*Clangula*) has been given to it from this supposed circumstance*. Others again have supposed that the peculiarity of structure might be of use in diving; yet no one has authenticated to us, that the male is able to stay longer under water than the female. Concerning the want or presence of an enlarged cavity, or labyrinth, as authors have called it, nothing can better suit our purpose than the examples of the *Scoter* and *Velvet Duck*, the latter of which has not only an enlargement of cavity at the bottom part, but likewise a large hollow in the middle, added to a third enlargement of hollow bone just below the *larynx*; but in the first-named not the least deviation from an uniformly cylindrical shape is seen throughout the whole of its length, in either sex:—yet, wonderful to say, the *Scoter* has by far the greater facility of the two, in respect to diving and staying under the water, and on account of this property of diving becomes one of the most difficult birds to kill in its own element, as twenty shots have been made at one of these, by a good marksman, before one has taken effect. We cannot do amiss also to remind the reader, that none of the genus of *Colymbus*, *Podiceps*, or *Uria*, which have acquired the name of *Divers* from being so often under water, do enjoy any material construction of the *trachea* different from the *Cock* and *Hen*, which are well known to avoid the water from instinct. Neither can I learn that any thing occurs to outward appearance, that should enable the *Corvorant*, *Shag*, and many others, to

* • Gesner supposes the name to have been given from clapping the wings at the first rising to take flight. “ Ab alarum clangore, quæ firmillimæ sunt, nec sine sono in volatu moventur.” *De Nat. Av.* p. 104.

dive with such facility as they are known to do. The *Wild Swan*, in which we observe a great elongation added to a peculiar curvature of the windpipe, is able to hold its head for a length of time under water in search of food ; but we have no authority for saying whether it can do so a longer time than the *Tame Swan*, in which no such peculiarity is seen. Besides, the common *Crane*, and others of the *Ardea* genus, which have not in their power even to swim, are endowed with a much greater elongation and curvature of the windpipe than the *Wild Swan*. In respect to what assistance such a construction of parts as abovesaid may afford to the tone of voice, I will not venture here to affirm ; yet it cannot be denied that some birds are able to utter very loud sounds without such aid—witness the *Cock*, *Peacock*, and others*. We see Nature's operations and admire them in course, yet cannot always comprehend the utility of her works ; and this seems one of her designs concerning which we are not at all clear. It, too, must be confessed, that the whole we have been able to obtain by our scrutiny into this subject is, the security of a mark of distinction, in respect to several species concerning which we have been more or less in a state of uncertainty.

I am aware likewise that anatomists have done much in regard to the discovery of sex, by observing the *testicles* of the *male*, which consist of two whitish glandular bodies placed just below the lungs, close to the back-bone, and the *ovaries*, or clusters of eggs, situated in the same place, in the *female*. It is true that the *sex* may, by at-

* How far the discovery of the dispersion of air-vessels, which are found among the fleshy parts of birds, pervading more or less even the *bones* themselves, and communicating with the lungs, may contribute to their being able to dive and stay so long under water, or whether this circumstance may assist in voice, song, or flight, is not for us here to determine. The matter is certainly worth further enquiry, but cannot make any part of this essay, further than to recommend the perusal of a Treatise on the subject by our late friend Mr. John Hunter, in the Philosophical Transactions.—See vol. lxxiv. p. 205.

tending

tending to the above circumstances, be most times got at the knowledge of; but we cannot thereby discriminate the *species*. And it is also more disappointing, that, at some seasons of the year, in particular subjects, these internal marks are so nearly obliterated as to deceive a very good comparative anatomist, and much less likely to be ascertained by any one who may be but slightly versed in such matters. But the particular circumstance of the *trachea*, as will hereafter be pointed out, never alters; except in being more or less complete in its period of ossification during the life of the bird. I ought not however to omit, that in a very careful comparison many traits of difference between one species and another may be detected by the skilful anatomist (although such may not have either labyrinth, or any enlargement of the *trachea* to distinguish them by), arising from the structure of the rings themselves, aided by the muscles appropriated to their motion; and it may be with confidence asserted, that one mean at least, if not the principal, of producing a loud noise, and on the contrary, may arise from the peculiar construction of these tracheal rings, which in many birds are found to be more or less complete in themselves; some of them wanting even a large portion of the circle, whilst others are not only perfect, but of a strong and elastic ligamentous nature, and some few so greatly indurated as to approach almost to the texture of bone*.—Added to which is the great difference of muscular appendages; for, in the birds which have a weak voice, the muscles are so likewise: on the contrary, very strong muscles are observable in those whose cry is loud, by which structure the rings, the strength of which is ever proportional, are put into violent action, and the bird thereby enabled to throw out the air with great force†. It is certain, also, that, in birds which

* As in the *Peacock*, *Goosanders*, *Smeu*, and some others.

† See a curious and elaborate dissertation on this subject in *Magazin Encyclopédique*, tom. ii. p. 334 et seq.

sing, the muscles of the *larynx* are stoutest in the *male*, and in the *Nightingale* are stronger in proportion than in any bird of the same size*. We have been imperceptibly led into the above discussion, although not originally meant to form any part of our plan, intending merely to illustrate such variations of *tracheæ* as palpably differed from the usual mode, either in respect to position or structure.

The deviations in respect to the windpipe from what is generally seen, may be divided into two kinds.—The *first*, wherein this organ, although of equal diameter or nearly so, differs in being somewhat longer than the neck, and thereby allowing of a double about the middle of it, as in the *Wood Grouse*—or, being further elongated, forming one or more folds either within the keel-like process of the sternum, which is hollowed out for that purpose, as may be seen in the *Wild Swan*, *Demoiselle*, *Crane*, &c.—or, instead of entering the keel, runs more or less over the surface of the breast beneath the skin, as instanced in the *Marail*, *Barraka*, *Guan*, and others, as will be hereafter noticed.

The *second* deviation is where the windpipe is unequal in diameter, although not elongated, but alters in shape and size, and in some birds very considerably, in its progress to the lungs, more especially just before its divarication into the two *bronchiæ*, or lung-pipes.

This last circumstance has been met with hitherto only in the *Duck*† and *Merganser* genera, or at least it is in these only that the *labyrinth*‡, as it has been termed by authors, has been

* Mr. Barrington supposes that the *Nightingale* may be distinctly heard at more than half a mile, if the evening be calm. *Phil. Trans.* vol. lxi. p. 279.

† I will not take upon me to say that other, and perhaps various kinds of, conformations of the *trachea* in the *Duck* genus may not hereafter be noticed; as we have good authority in respect to one species, where the windpipe runs on the surface of the breast in the manner of the *Guan*. See No. vi.

‡ *Ampulla* seu *Labyrinthus*, *Rai Syn. Av.* p. 135. *Will. Orn.* p. 253, et alibi. *Labyrinth*, *Will. Orn.* (Ed. Angl.) p. 335. *Ray's Letters*, p. 163.

found: and further, that it is the *male* alone which has this mark of discrimination; for although many birds may be found having the *female* plumage, in which the labyrinth is equally conspicuous with others possessing that of the other sex, yet I will venture to affirm, that this part differs not from that of an old male, except in respect to the ossification being less complete; and again, that in every specimen with such enlargement of *trachea*, or labyrinth, the *testes*, an indubitable mark of the *male* sex, will invariably be found to accompany it.

Among other errors, the *Glaucium* of authors, or *Morillon* of the French, has been recorded as a distinct species by many. This however may easily be proved a fallacy by dissection, as the bird is no other than the *Golden Eye* in imperfect feather; for this species does not attain the adult plumage for at least the first season, perhaps longer. Another bird, passing under the name of *Morillon*, proves, by the same test, to be the young of the *Tufted Duck*; and a third called *Morillon* also, merely a young *Scaup*, which I have more than once identified. Besides, were the difference of *bill* alone in these birds attended to, it could not fail to decide the matter, as they are greatly unlike each other in this particular, notwithstanding the external colour of feather might lead a superficial observer to think them the same.

The *wild Swan* is not greatly unlike the *same* species in respect to plumage, the difference of bill at first sight appearing to be the chief external characteristic, inasmuch as to deceive some Naturalists into the supposition of their being varieties only of one and the same species*; but

* *M. de Buffon* was apprised of the difference of internal structure, but accounts for it on a singular principle, when he observes in a note: "Selon Willughby cette particularité de conformation est propre au cygne sauvage, & ne se trouve point la même dans le cygne domestique, ce que semble fonder ce que nous allons rapporter de la différence de leur

but under the eye of the Anatomist, who examines them internally, how widely do they differ!—In the *tame* one, little more occurs in respect to the windpipe than is to be seen in the common *Cock*, whilst in the *wild Swan* it is lengthened greatly, and, entering a hollow in the keel of the sternum, forms a doubling therein, before it returns to enter into the cavity and attach itself to the lungs, as will be hereafter shewn.

It seems unnecessary to say more on this subject in a general way, as the circumstances will occur in course under their particular heads: to avoid repetitions, therefore, I shall proceed to the descriptions themselves; and, first, of those birds in which the *trachea* or windpipe obtains a singularity, from its various inflexions in its passage to the lungs, without greatly deviating from the uniform and cylindrical shape, beginning with

I. TETRAO UROGALLUS—WOOD GROUS. *Tab. ix. Fig. 1.*

T. fusco-rufus, capite colloque cinereis, gula abdomineque nigris, axillis albis.

Tetrao Urogallus, Linn. Syst. Nat. p. 273.—Ind. Orn. 2. p. 634.—

Frisch. t. 107, 108.—Raii Syn. Av. p. 53. A. 1.—Will. Orn. t. 30.

Auerhahn, Besch. der Berl. Nat. Fr. iv. p. 589. t. 18. f. 2.

Coq de Bruyere, Buf. Ois. ii. p. 191. t. 5.—Pl. Enl. 73, 74.

Wood Grouse, Cock of the Wood, Br. Zool. i. t. 40, 41.—Gen. Syn. iv. p. 729.

In order to ascertain the species here meant, it is right to observe, that the *Wood Grouse* is well represented in the *British Zoology*, and

“voix, mais cela ne suffiroit peut-être pas pour prouver que leurs espèces soient différentes: cette diversité n’excédant pas la somme des impressions tant intérieures qu’extérieures, que la domesticité & ses habitudes peuvent produire à la longue sur une race assujettée.” *Hist. des Ois. ix. p. 24. (f).*

is also figured in the *Planches Enluminées*, as well as the Plate referred to in Frisch's work, where the reader may likewise learn the description and manners.—He will, in like manner, be directed to the synonyms of such authors as may be necessary for him to consult, in respect to the other birds mentioned in this treatise, the design of which being chiefly that of describing the organ of respiration called the *trachea* or windpipe; and as the *Wood Grouse* seems to deviate from the common road, in a less degree than others which will be hereafter mentioned, it seems most proper to begin our subject with.

The windpipe in this species, otherwise than being longer than the neck, does not furnish us with any thing material in respect to general conformation: it passes in a straight direction downwards as far as the crop, where it takes a bend upwards, and again turning downwards, goes on to the lungs in the usual way.

As the bird is very rare in this kingdom, I have never been able to examine more than one, which came from the North of Europe, and of which very little of the *trachea* remains with me, except the parts composing the bend: I have therefore availed myself of the drawing of Dr. Bloch in the *Berlin Transactions* above referred to, in order to perfect my figure, in which *a* represents the *tongue*—*bb* the *os hyoides*, or bone of the tongue, with its appendages—*c* the *larynx* with the *glottis* or orifice therein for the admission of air—*dd* muscles which accompany the *trachea*, one on each side, serving to lengthen or shorten it at the will of the bird—*f* the *trachea* or windpipe itself, forking off into two parts called *bronchiæ*, which divaricate into numberless smaller tubes, and lose themselves in the various ramifications of the lungs.

This general structure of parts is greatly similar in all birds, and will serve throughout this *Essay* whenever we may have occasion to speak of them, having in view such readers as may not be con-

versant in anatomy; to those who are, it will be unnecessary to say more, and to the uninformed I should hope it may prove enough.

As far as I can learn, no particularity is observable in the windpipes of the three others of this genus which frequent this kingdom, viz. the *Black Cock*, *Red Grouse*, and *Ptarmigan*. The two first I have myself examined; but in respect to the *Ptarmigan*, I have not as yet had an opportunity of seeing it in a recent state; however, I am informed that nothing particular has been noticed in respect to the parts in question.

II. PENELOPE MARAIL—MARAIL TURKEY. *Tab. ix. Fig. 2.*

P. capite subcristato, temporibus gulæque incarnatis carunculatis.

Penelope Marail, *Gmel. Syst. Nat.* 7. p. 734.—*Indl. Orn.* 2. p. 620.

Faïfan verdâtre de Cayenne, Le Marail, *Bef. Ois.* ii. p. 390.—

Pl. Enl. 338.

Marail Turkey, *Gen. Syn.* iv. p. 682.

This bird inhabits the woods of Cayenne and Guiana, where it is gregarious, and not unfrequently seen about houses; it is likewise brought up tame, in the manner of our domestic poultry.

The *trachea* follows the course of the neck as far as the breast, where it rises on the outside of the flesh, being covered only by the skin and feathers, and passes downwards some way; after which it returns upwards, and, bending over the right clavicle or collar-bone, divides into the two usual portions, entering the cavity, and joins the lungs: at the part where it makes the curve on the breast, it is kept in its place by a strong muscle, which is perceivable quite to the breast-bone. The above is observed in both sexes. The general cry is said to be not inharmonious; except when irritated or wounded, when it is harsh and loud.

III. PHASIANUS PARRAKA—PARRAKA PHEASANT.

Tab. ix. Fig. 3.

Ph. subcristatus fuscus subtus fulvus, caudâ elongatâ apice integrâ.

Phasianus Parraka, *Gmel. Syst. Nat.* i. p. 740.—*Ind. Orn.* ii. p. 632.

Le Parraka, *Buf. Ois.* ii. p. 394.—*Mem. sur Cayen.* i. p. 378.—*Pl. Enl.* 1. 2.

Parraka Pheasant, *Gen. Syn.* iv. p. 722.

This bird is common in the woods of Guiana, and differs from the former in having the *trachea* of a much greater length, descending on the breast more than half way before it makes a turn upwards; after which it passes over the right clavicle, into the cavity of the breast. It may be observed, that in both these birds the descent is on the left side, and the ascent on the right. The *Parraka*, however, differs from the *Marail*; for the *male* only has the elongation of the *trachea*; in the *female* it passes immediately to the breast without the least singularity. This bird is said to set up a very loud cry at sun-set, which is thought to be the loudest of all birds in the new world, and to greatly resemble the word *Parraka* repeated many times together, from which it has obtained the name.

IV. PENELOPE CRISTATA—The GUAN. Tab. x. Fig. 1.

P. capite pennis erectis cristato, temporibus violaceis.

Penelope cristata, *Gmel. Syst. Nat.* i. p. 733.—*Ind. Orn.* ii. p. 619.

Meleagris cristata, *Linn. Syst. Nat.* i. p. 269.

Jacupema Raii *Syn. Av.* p. 56. 2.—*Will. Orn.* p. 165. t. 28.

Merrem. Ic. Av. ii. p. 42. t. 4.

Guan or Quan, *Edw. Pl.* 13.—*Gen. Syn.* iv. p. 680. 3.

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The *Guan* frequents the same places as the two last birds, and like them is frequently domesticated: but in the singularity of the windpipe, it far exceeds them; for it not only descends much lower on the breast, but at the bottom part it doubles upwards for at least one third of its length:—it differs also in another particular; for, instead of making a descent on the left side, it passes down on the right, and, contrary to the others, returns upwards, and goes into the cavity of the thorax over the left clavicle.—I owe the drawing of the figure, from which my representation of it is copied, to the kindness of my late friend Sir Ashton Lever, who was induced, from its great peculiarity, to have the parts sketched as they appeared in the recent state.

V. CRAX PAUXI—CUSHEW CURASSOW. *Tab. xi. Fig. 1 & 2.*

Cr. cerâ cœruleâ, narium gibbere cristato, corpore nigricante, abdomine apiceque caudæ albis.

Crax Pauxi, *Linn. Syst. Nat.* i. p. 270.—*Ind. Orn.* 2. p. 624.—*Briss. Orn.* i. p. 302.

Hocco de Mexique, Le Pierre, *Buf. Ois.* ii. p. 348.—*Pl. Enl.* 78.—*Mem. de l'Acad. des Scien.* 1781. p. 376. pl. viii.

Cushew Curassow, *Edw. Pl.* 295. f. 2.—*Lath. Syn.* iv. p. 696.

The *trachea* in this species does not greatly differ from those of the *Parraka* and *Guan*, but appears to be the largest, in proportion to the bird, of any yet observed:—it extends on the outside of the breast under the skin in a similar manner, and first passes downward over the right pectoral muscle, going on straight quite to the end of the sternum, at which place it makes a convolution to the left for three inches in length, and somewhat in the shape of a ring; after which it returns again over the right pectoral muscle, and turns over the clavicle into the thorax.

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The above account is extracted from a Dissertation on this bird, in the Memoirs of the Academy of Sciences ; but no anatomical figures accompany it, although a good representation of the bird itself is given at the end of the Essay. This circumstance, however, is the less to be regretted, as I have been favoured with the two views annexed, from the rich and elegant Museum of John Heavyside, Esq. of Great George Street, who, amongst many curious anatomical subjects, possesses a preparation of the parts in very fine condition.

VI. ANAS SEMIPALMATA—SEMIPALMATED GOOSE.

A. grisea, capite collo femoribusque nigris, collari uropygio corporeque subtus albis, pedibus semipalmatis.

Habitat in Novâ Hollandiâ.

This seems to be a species not hitherto described ; it is nearly of the size of the *wild Goose* : the bill is brown, and the cere passes on each side to the eyes ; the head, neck and thighs are black ; a collar of white encircles the lower part of the neck, and the rump and under-parts are also white ; the legs are red, and the toes only webbed half-way from the base.

This is met with near Hawksbury river, in New South Wales, in flocks, and is there called *New South Wales Goose*. It is peculiar in that the windpipe forms several beautiful circumvolutions on the breast, under the skin, before it enters the thorax : its note is said to be tuneful and melodious ; and it was observed sometimes to perch on trees, in the manner of the *Whistling Duck*.

I was favoured with a sight of a drawing of the bird, added to the above account of its manners, at A. B. Lambert's, Esq. Lower Grosvenor Street.

VII. CRAX

VII. CRAX ALECTOR—CRESTED CURASSOW. *Tab. x. Fig. 2. 3.*

Cr. cerâ flavâ, corpore nigro, ventre albo.

Crax Alector *Linn. Syst. Nat.* i. p. 269.—*Ind. Orn.* 2. p. 622.—*Briff. Orn.* i. p. 298. t. 19.

Mituporanga, *Raii Syn.* p. 56. 6.—*Will. Orn.* p. 115. t. 28.

Hocco de la Guiane, *Buf. Ois.* ii. p. 375. pl. 13.

Indian Cock, *Pitf. Mem.* t. p. 190.—*Phil. Transf.* lvi. p. 215. t. 10. fig. 3.

Crested Curassow, *Gen. Syn.* iv. p. 690.

This likewise is a bird of some peculiarity in respect to the *trachea*, which is pretty stout, and the rings in proportion: it passes in a straight direction to the bottom of the neck, at which part it loses its round form, and becomes somewhat broad and flat; it then turns backwards and upwards for more than an inch, when it doubles again forwards and downwards; after which it enters the cavity of the breast, and is distributed by its two portions into the lungs.—This circumstance takes place at the front of the keel of the sternum or breast-bone, but does not enter into the keel itself, as in the three following species.

In the Philosophical Transactions above quoted is a figure of the subject given by Dr. Parsons; it is also represented in the Plate referred to in Pitfield's translation of *Memoires pour servir à l'Histoire des Animaux*. The first of these I have thought right to copy (fig. 2.) and I have added also the figure of one which belonged to a bird in my own collection (fig. 3.), from which it differs not a little:—but I find that this part of the *trachea* is apt to vary in different specimens; for a second figure, engraved in the same Plate of Pitfield, shews the bend to be very small, appearing like a mere twist only; from which circum-

circumstance, we may conclude that other varieties may be occasionally met with.

Whether the *female* has such a conformation of parts is not in my power to determine; but it may be observed, that the two birds dissected by the Academy of Sciences, as well as my own, were *males*.

VIII. ARDEA VIRGO—DEMOISELLE HERON. *Tab. x. Fig. 4.*

A. superciliis albis posticè retrorsumque cristatis.

Ardea Virgo, *Linn. Syst. Nat.* i. p. 234.—*Ind. Orn.* 2. p. 673.

La Grue de Numidie, *Buf. Oif.* vii. p. 313. pl. 15.—*Pl. Enl.* 241.

Demoiselle or Numidian Crane, *Gen. Syn.* v. p. 35.—*Edw. Pl.* 134.

Pitf. Mem. t. p. 204.—*Phil. Transf.* lvi. p. 210. t. xi. f. 5.

This beautiful and elegant bird is well known in our menageries, and is frequently so tame as to mix with the poultry, though in the winter season it requires defence from cold. In it the *trachea* enters a cavity in the keel of the sternum for about three inches, when it returns after making a bend as in the two following species, and passes into the chest. I had, many years since, an opportunity of observing this circumstance in a specimen of my own; but, from the great length of time, the part had so far perished as to render it impossible to take a drawing from it. I am therefore constrained to copy the figure in the Philosophical Transactions, which I have not the least doubt of being sufficiently authentic.

IX. ANAS CYGNUS—WILD SWAN. *Tab. xii. Fig. 1. 2.*

A. rostro semicylindrico atro, cerâ flavâ, corpore albo.

Anas Cygnus, *Linn. Syst. Nat.* i. p. 194.—*Ind. Orn.* 2. p. 833.—

Brif. Orn. vi. p. 292. t. 28.—*Raii Syn. Av.* p. 136. A. 2.

VOL. IV.

P

Cygne

Cygne fauvage, *Buf. Oif.* ix. p. 3.

Der Singchwan, *Beckst. Vog. Deutsch.* ii. p. 581.

Wild or Whistling Swan, *Gen. Syn.* vi. p. 433.—*Br. Zool.* ii.

No. 264.—*Edw.* t. 150.—*Phil. Transf.* lvi. pl. x. p. 215. f. 1. 2.

The *Wild Swan* is a bird much less known than the *tame* species, which is every where domesticated, for it only visits this kingdom in very severe seasons;—it differs from the last, firstly, in the bill, which may be seen by comparison; and secondly, in size, being smaller. The plumage likewise is by no means of that dazzling snowy whiteness which characterises the *tame* species; but the essential and specific mark of distinction is that of the *trachea*, in which, as well as in the conformation of the breast-bone itself, it is so particularly different as to prove at once that there can be no relation whatever between the two.

The windpipe in the *Wild Swan*, meant in this place to be treated of, passes down the neck the whole of its length, after which it enters the keel of the sternum, passing backwards therein nearly the whole of its length, when it bends upwards and forwards, and then enters the cavity of the breast, to communicate with the lungs. It is not necessary to mention further particulars, as the figure of the breast-bone and *trachea* in situ will sufficiently point out the circumstance; nor is it necessary to say more in this place, than that the above structure of parts is observable in both sexes indifferently.

To obviate every possibility of mistake between the two species, I have thought right to exhibit a front view of the breast-bone of both, in which a large cavity may be seen in that of the wild species, sufficient to admit of the entrance and exit of the *trachea*, as well as its doubling therein; whilst in that of the *tame* Swan (Tab. xii. fig. 3.) no other structure is observable than in the common goose.

X. ARDEA

X. ARDEA GRUS—The CRANE. *Tab. xii. Fig. 4.*

A. occipite nudo papilloso, pileo remigibusque nigris, corpore cinereo, tectricibus intimis laceris.

Ardea Grus, Linn. Syst. Nat. i. p. 234.—Ind. Orn. 2. p. 624.—Raii Syn. Av. p. 95. A. 1.—Will. Orn. p. 294. t. 48.

La Grue, Buf. Ois. vii. p. 287. fol. 14.—Pl. Enl. 769.

Der Kranich, Besch. der Berl. Nat. Fr. iv. p. 586. t. xvi.

The Crane, Gen. Syn. v. p. 50.—Br. Zool. ii. App. p. 629. pl. 6.—Phil. Transf. lvi. p. 208. t. II. f. 4.

In this bird the *trachea* enters the keel of the sternum in like manner as in the *Wild Swan*; with this difference, that it is doubly reflected*, as may be seen by consulting the figure. As in the *Wild Swan*, so in the *Crane*, we find that both sexes have the same conformation of parts, excepting that, in respect to the *Crane*, the *trachea* in the female does not pass near so far into the keel of it as in the male, nor is the doubling nearly so considerable.

—WE now pass to birds in which the *trachea* enlarges in various parts, especially just at the angle of divarication, where it goes to the lungs; and which last circumstance, for want of a better name, authors have agreed to call by the name of *Ampulla*, or *Labyrinth*, as before observed, p. 96.

* To use the expression of Dr. Parfons, "This may be compared to a French-horn, whereas that of the *Wild Swan* is straight within the bone, and may be compared to a Trumpet; yet the entrance of this into the sternum and its exit, and its passage into the cavity of the thorax, are similar to those of the *Wild Swan*." See *Phil. Transf.* l. c.

XI. ANAS CRECCA—The TEAL. *Tab. xiii. Fig. 1.*

A. speculo alarum viridi, linea alba supra infraque oculos.

Anas Crecca, *Linn. Syst. Nat.* i. p. 204.—*Ind. Orn.* 2. p. 872.—*Raii Syn. Av.* p. 147. A. 6.

Petite Sarcelle, *Buf. Ois.* ix. p. 265. pl. 17. 18.—*Pl. Enl.* 947.

Krikente, *Besch. der Berl. Nat. Fr.* iv. p. 600. t. 18. f. 6.

Common Teal, *Gen. Syn.* vi. p. 551.—*Br. Zool.* ii. No. 290.—*Will. Orn.* p. 377. t. 74.

The Teal is a well known bird, and perhaps the smallest of the Duck kind. The labyrinth is in proportion to the size, as big as a large pea on one side, and spreading on the opposite part into a kind of convex shape, at the bottom of which the *bronchiæ* or lung-pipes are attached.—The *female* has no labyrinth.

XII. ANAS QUERQUEDULA—The GARGANEY.

Tab. xiii. Fig. 2. 3.

A. macula alarum viridi, linea alba supra oculos.

Anas Querquedula, *Linn. Syst. Nat.* i. p. 204.—*Ind. Orn.* 2. p. 872.
Raii Syn. Av. p. 148. 8.

Sarcelle, *Buf. Ois.* ix. p. 260.—*Pl. Enl.* 946.

Winterholbente, *Besch. der Berl. Nat. Fr.* iv. p. 600. t. 18. f. 4?

Garganey, *Gen. Syn.* vi. p. 550.—*Br. Zool.* ii. No. 289. pl. 101.—*Will. Orn.* p. 377. pl. 74.

This bird measures, from bill to tail, seventeen inches, being three inches longer than the *Teal*. The labyrinth is larger, and differs considerably in shape, being nearly oval, and placed **perpendicularly**, so as to appear rather as a continuation of the *trachea*, than an appendage to it, as in several other species. It is externally a trifle **indented on one side**, in which furrow a muscle* passes, making it ap-

* Two muscles, one on each side, are seen in all fresh specimens; but, when dry, these are many times scarcely to be detected.

pear as divided into two unequal portions; on the opposite part, or that situated next the breast, it is flattened, and from the upper part of it the two *bronchiæ* have their origin.

I have some reason for affirming, that authors have unnecessarily divided the Teals into more species than really exist; for the *Teal* so called, and the *Summer Teal*, certainly constitute but one; and although *males* have been met with of the latter, it is probable that the external distinction of feather may not be fixed till the second year, or even beyond that period: it is not enough that the *testes* are visible; for, as above mentioned, that circumstance of itself can only prove the *sex*: it is to the labyrinth alone that we must have recourse in all birds which possess it; for this remains nearly the same during life. I scarcely need here observe, that the *male* alone possesses the labyrinth, not only in this, but also in every other species of Duck hitherto examined.

XIII. ANAS CLYPEATA—The SHOVELER. *Tab. xiii. Fig. 4 5.*

A. rostri extremo dilatato rotundato, ungue incurvo.

Anas clypeata, Linn. *Syst. Nat.* i. p. 200.—*Ind. Orn.* ii. p. 856.—

Raii Syn. p. 144. A. 9. et 13.—*Bris. Orn.* vi. p. 329. t. 32. f. 11.

Le Souchet, *Buf. Ois.* ix. p. 191.—*Pl. Enl.* 971. 972.

Die Löffelente, *Schr. der Berl. Nat. Fr.* iii. p. 373. t. 7. f. 2.

Shoveler, *Gen. Syn.* vi. p. 509.—*Br. Zool.* ii. No. 280.

This bird is about two inches longer than the last, and is far from being uncommon. The end of the *trachea* is furnished with a labyrinth, which is small in proportion to the size of the bird, being scarcely more than half the size of that of the *Garganey*. It is of nearly equal dimensions throughout, except near the bottom, where it slightly enlarges; on the left side is a kind of bony bladder a little irregular in shape, about the size of a large rounceval pea, with two or three slight indentations on the sides;—from this springs
one

one of the *branchiæ* ; the other arises from a kind of bony arch, with which the *trachea* ends, and which is a trifle above the level of the top of the labyrinth.

XIV. ANAS ACUTA—The PINTAIL DUCK. *Tab. xiii. Fig. 6.*

A. cauda acuminata elongata fubtus nigra, occipite utrinque linea alba, dorfo cinereo undulato.

Anas acuta, *Linn. Syst. Nat.* i. p. 201.—*Ind. Orn.* 2. p. 864.—*Raii Syn. Av.* p. 147. A. 5.—*Briss. Orn.* vi. t. 34 f. 1. 2.

Canard à longue queue, *Buf. Oif.* ix. p. 199. t. 13.—*Pl. Enl.* 954.

Pfeilschwanz, *Besch. der Berl. Nat. Fr.* iv. p. 601. t. 18. f. 5.

Pintail, *Gen. Syn.* vi. p. 526.—*Br. Zool.* ii. No. 282.—*Will. Orn.* p. 376. t. 73.

This species measures twenty-eight inches in length, and is common in our markets in the winter season. The *trachea* finishes in a bony arch like the former, from which one of the branches of divarication springs : attached to the side of this is a nearly round bony bladder, delicate in texture, and about the size of the end of the thumb ; the upper surface of it about even with the top of the bony arch, but the bottom greatly below it : from which circumstance it is, independent of size, particularly distinguished from the same part in the *Wigeon*, though at first sight appearing somewhat similar. It may not be amiss here to observe, that, in young birds, this roundish bladder will suffer itself to be indented by pressure, but at mature age becomes very brittle, so as not to be handled without some care ; from the under and inner part of this, the second division of the *trachea* takes rise. The opposite side is formed not greatly different, but puts on the appearance of an oval obliquely placed, in the same manner as in the opposite side of the *Gadwall*, or next species.

XV. ANAS STREPERA—The GADWAL. *Tab. xiii. Fig. 7. 8.*

A. speculo alarum rufo nigro albo.

Anas strepera, *Linn. Syst. Nat.* i. p. 200.—*Ind. Orn.* ii. p. 859.—*Raii*

Syn. Av. p. 145. A. 2.—*Bris. Orn.* vi. p. 339. t. 33. f. 1.

Chipeau, *Buf. Ois.* ix. p. 187. t. 12.—*Pl. Enl.* 958.

Gadwal or Grey, *Gen. Syn.* vi. p. 515.—*Br. Zool.* ii. No. 288.—

Will. Orn. p. 374. t. 72.

This species is about 15 inches long, but is much less common than the former. The windpipe is long, and furnished with a bony bladder and arch as in the last species, but differs in shape, and the globular part is not near so large; it is likewise elongated upwards and downwards in an oblique direction, and is a little compressed on the sides: it is also distinguished from the *Pintail* in another particular, which is, that the bony orb in that species adheres to the side of the arch by a small portion only, whereas in the *Gadwal* it is firmly fixed to it at the bottom; that portion of it which lies next to the *trachea* is flat, and in the recent state joined thereto closely by a membrane. The bony arch too is full half an inch in height, differing in this particular from that of the *Pintail*, which is scarcely three-eighths of an inch; and this proportion of parts holds good in every specimen which has come under my inspection.

XVI. ANAS PENELOPE—The WIGEON. *Tab. xiii. Fig. 9.*

A. cauda acutiuscula crisso nigro, capite brunneo, fronte alba, dorso cinereo undulato.

Anas Penelope, *Linn. Syst. Nat.* i. p. 202.—*Ind. Orn.* ii. p. 860.—

Raii Syn. Av. p. 146. A. 3.—*Bris. Orn.* vi. t. 35. f. 2.

Canard siffleur, *Buf. Ois.* ix. p. 169. t. 10, 11.—*Pl. Enl.* 825.

Pfeifente,

Pfeifente, *Besch. der Berl. Nat. Fr.* iv. p. 601. t. 18. f. 5.

Wigeon, Whewer, Whim, *Gen. Syn.* vi. p. 518.—*Br. Zool.* ii. No. 286.—*Will. Orn.* p. 375. t. 72.

The total length is 20 inches. The *trachea* at first sight does not seem materially to differ from that of the *Pintail*, yet on a more narrow inspection will be found not to accord with it. In the first place the bony orb is smaller, not being larger than the end of the finger—both indeed seem globular, but that of the *Wigeon* is most perfectly so. They both differ likewise in point of attachment. In the *Pintail* it is united to the side of the arch on a line above the centre, in the *Wigeon* somewhat below it, and the bottom of both the orb and arch are nearly even, but in the *Pintail* the bottom of the arch is higher of the two—besides which, the bony arch itself is a little different in shape, as may be seen by comparing the two figures. The opposite parts of both put on an appearance not greatly different from those of the *Gadwal*, which makes it unnecessary to give a figure of them in that situation.

From the above comparison, it is presumed that no one will hereafter confound the last three birds together.

XVII. ANAS BOSCHAS—The MALLARD. *Tab.* xiii. *Fig.* 10.

A. rectricibus intermediis (maris) recurvatis, rostro recto.

Anas Boschas, *Linn. Syst. Nat.* i. p. 204.—*Ind. Orn.* ii. p. 850.—

Raii Syn. Av. p. 145. *A.* 1. 150. 1.

Canard sauvage, *Buf. Ois.* ix. p. 115. t. 7. 8.—*Pl. Enl.* 776. 777.

Die zahme und die wilde Ente, *Besch. der Berl. Nat. Fr.* iv. p. 601. t. 18. f. 5.

Mallard and Wild Duck, *Gen. Syn.* vi. p. 489.—*Br. Zool.* ii. No. 279. t. 97.—*Will. Orn.* p. 308. t. 72. 75.

This

This species is larger than any of the *Duck* genus before mentioned, except the *Swan* and *Semipalmated Goose*, and the *trachea* is stouter in proportion. The globular part is a trifle bigger than in the *Pintail*, but loses its round shape in some measure at the lower portion of it: it is likewise much less smooth on the surface, being somewhat furrowed, and marked with minute wrinkled lines. The bony arch is much deeper than in any of the foregoing, is attached to the globular part almost the whole of its length, and in some specimens measures full three-fourths of an inch. The whole of this part likewise is stronger than in any species before described. The labyrinthic or globular part of the *trachea* indeed varies a little in respect to size, both in the wild and tame sorts, but is in general larger in the domesticated ones. Much controversy has been held concerning the *Curved-billed Duck*; some supposing it to be a variety only of the *Mallard*, and others wishing to make it a distinct species. This bird has not come under our view anatomically, having only met with it in menageries, or preserved in collections; but it is to be wished that a strict comparison may be made in respect to the *trachea*, by means of which I have not a doubt of the different opinions being at once settled.

XVIII. ANAS MOSCHATA—Muscovy Duck. *Tab. xiv. Fig. 1, 2.*
Tab. xvi. Fig. 5, 6.

A. facie nuda papillofa.

Anas moschata, *Linn. Syst. Nat.* i. p. 199.—*Ind. Orn.* ii. p. 846.—

Raii Syn. Av. p. 148.—*Frisch.* t. 180.

Le Canard musqué, *Buf. Ois.* ix. p. 162. pl. 9.—*Pl. Enl.* 989.

Die Türkische Ente, *Schr. der Berl. Nat. Fr.* iii. p. 372. t. 7. f. 1.

Muscovy Duck, *Gen. Syn.* vi. p. 476.—*Will. Orn.* p. 381, 382.

The *trachea* in this bird is stout, and nearly of equal diameter, but

VOL. IV.

Q

a trifle

a trifle smaller towards the bottom: the bony arch, as in others, finishes the bottom part, and seems as if furnished with rings, but they are not moveable as in the rest of the *trachea*. The orbicular labyrinth is attached to the side of it; this is not smooth on the surface as in the *Pintail* and *Wigeon*, but universally rough, and irregularly furrowed with fine indented lines. The opposite side runs into a pear shape, and is placed obliquely, with the pointed end lowest, as in the two last named birds; but is flattened considerably on the surface. The bony arch on this side is smooth, having no appearance of rings, and is bent at a small angle from the *trachea*, although it constitutes a continuance of it: this is the description of the organ in a young bird.

In a specimen somewhat more advanced in age, with which I was favoured by Mr. Lamb of Reading, the bony labyrinth approaches more to a rounded shape, and is larger, but still retains the rough surface, and the appearance of bony rings on the arch seems less distinct;—and in an old bird, the drawing of which I was favoured with by Mr. Boys, the labyrinth is not only much larger in size, but is nearly globular, and the bony arch quite smooth: yet Mr. Boys observes, that the labyrinthic part is finely granulated and faintly wrinkled, and the texture firm and bony; but in this last circumstance it does not differ from the younger ones. As to that figured by Dr. Bloch, in the *Berlin Transactions*, it seems at first sight too large by many degrees; yet I will not venture to say that his figure of it is faulty, for in case the *Muscovy Ducks* ever arrive at twice the size we usually see them in England, which they are said to do in warm climates, no doubt but the labyrinth will bear its due proportion.

XIX. ANAS MARILA—SCAUP DUCK. *Tab. xiv. Fig. 3, 4.*

A. nigra, humeris cinereo-undulatis, abdomine speculorum alari albis.

Anas Marila, *Linn. Syst. Nat.* i. p. 196.—*Ind. Orn.* ii. p. 853.—*Raii Syn.* p. 142. A. 6.

Die Bergente, *Besch. der Berl. Nat. Fr.* iv. p. 602. t. 17. f. 3, 4.

Scaup Duck, *Gen. Syn.* vi. p. 500.—*Br. Zool.* ii. No. 275. pl. 100.
—*Will. Orn.* p. 365.

The breadth of the *trachea* of this species, in the middle, is full half an inch ; it lessens a trifle towards the top, but diminishes very considerably as it approaches the bottom, so as not to measure more than three lines where it joins the labyrinthic part ; the total length is from $7\frac{1}{2}$ to 8 inches. We find the name of *labyrinth* generally given to this portion of the *windpipe* of the foregoing Ducks ; and we continue the appellation, although the corresponding part in many may be more aptly compared to a *drum*, and in course the word *tympanum* might be substituted for that of *ampulla* ; as this part, instead of being globular, presents a more or less flattened surface, covered over with a membrane similar to that of a drum-head, and stretched in the same manner. This drum-like labyrinth exists on the left side of the *trachea*, in respect to its situation in the neck of the bird, in the same manner as the globular labyrinths, and in the *Scaup* seems to be the most conspicuous of any that possess it. The flattened surface of the labyrinth is for the most part open, except round the rim, and has an irregular bony arch crossing it from side to side ; independent of these, the surface is covered with a delicate fine elastic membrane stretched over the surface, giving the idea of the head of a drum in miniature. The lower part of the

bony rim is much stronger than any other part of it, and is curved backwards, taking into its middle one of the *bronchiæ*. The other side consists of a bony box, swelling in the middle, and furrowed by several transverse bands: from this springs the other *bronchia*.

XX. ANAS FERINA—The POCHARD. *Tab. xiv. Fig. 5, 6.*

A. cinereo-undulata, capite brunneo, fascia pectorali crisso uropygioque nigro.

Anas ferina, Linn. Syst. Nat. i. p. 203.—Ind. Orn. ii. p. 862.—

Raii Syn. Av. p. 143. A. 10.—Briss. Orn. p. 384. pl. 35. f. 1.

Millouin, Buf. Ois. ix. p. 216.—Pl. Enl. 803.

Der Rothhals, Besch. der Berl. Nat. Fr. iv. p. 602. t. xvii. f. 5, 6.

Poker, Pochard, Red-headed Wigeon, Gen. Syn. vi. p. 523.—

Br. Zool. No. 284.—Will. Orn. p. 367. t. 72.

The *trachea* of the *Pochard*, at first sight, seems to be similar to that of the *Scaup*, but, on investigation, will be found to differ considerably. In the first place, it is full two inches shorter; it is also of very nearly the same dimensions throughout, or narrowing very little at the bottom. The drum-like labyrinth approaches greatly to that of the *Scaup* in texture, but is more round on the upper side; it is however crossed by a small bony partition as in that bird—in both cases, as may be supposed, by way of strengthening the membrane which covers the cavity. The bony box, of which the other portion of the labyrinth consists, is scarcely elevated on this side, and on the other much less so than is seen in the *Scaup*; it likewise forms an obtuse angle with the rest of the *trachea*, but in the *Scaup* it does not deviate from a continuation of a straight line, although forming a considerable enlargement.

XXI. ANAS

XXI. ANAS FULIGULA—TUFTED DUCK.

A. cristâ dependente, corpore nigro, abdomine speculoque alarum albis.

Anas Fuligula, *Linn. Syst. Nat.* i. p. 207.—*Ind. Orn.* ii. p. 869.—

Raii Syn. Av. p. 142. A. 7.—*Briss. Orn.* vi. p. 411. t. 37. 1.—
Morillon, *Buf. Ois.* ix. p. 227. t. 15.—*Pl. Enl.* 1001.

Europaische Haubente, *Besch. der Berl. Nat. Fr.* iv. p. 603.

Tufted Duck, *Gen. Syn.* vi. p. 540.—*Br. Zool.* No. 274.—*Will. Orn.* p. 365. pl. 73.

The *trachea* in the *Tufted Duck* is similar in some respects to that of the *Scaup*, in others to that of the *Pochard*. The drum-like portion of it resembles the same part in the last-named bird, inasmuch as scarcely to be distinguished from it; but the bony box-like portion of it is elevated, and not otherwise to be distinguished from that of the *Scaup*, than in being smaller. The *trachea* itself is of equal dimensions throughout, though smaller than either of the foregoing. By attending to these particulars it cannot be mistaken for any other, and in course will prevent the occasion of giving a representation in order to identify it.

XXII. ANAS TADORNA—The SHIELDRAKE. *Tab. xv. Fig. 8, 9.*

A. rostro fimo, fronte compressa, capite nigro-virescente, corpore albo variegato.

Anas Tadorna, *Linn. Syst. Nat.* i. p. 195.—*Ind. Orn.* ii. p. 854.—

Raii Syn. Av. p. 140. A. 1.—*Briss. Orn.* vi. p. 344. pl. 33. f. 2.

Die Brandente, *Schr. der Berl. Nat. Fr.* iii. p. 373. t. vii. f. 3, 4.

Shieldrake, *Gen. Syn.* vi. p. 504.—*Br. Zool.* ii. No. 278.—*Will. Orn.* p. 363. pl. 70, 71.

The

The *Shieldrake* is one of the most beautiful of the Duck genus, and the lower part of the *trachea* in the male is of a singular construction, being not strictly similar to any of the foregoing; it is pretty long, and nearly of equal dimensions, except towards the bottom part, where it lessens somewhat: just above the divarication are two bony kind of roundish bladders, one larger than the other, of unequal surface, and most delicate texture, being of so tender a fabric as scarcely to bear the pressure of the finger, without indenting in young subjects, or breaking in older ones; and, when dry, putting on more or less of a shrivelled appearance, though in a recent state they appear to be nearly transparent. Though so greatly different from the same part in the *Mallard*, as before described, yet its voice is said not to be unlike that bird.

WE now proceed to some birds, in which not only an enlargement at the lower end of the *trachea* is observable, but likewise the *trachea* itself is either dilated, or otherwise enlarged, and sometimes in more places than one.

XXIII. ANAS CLANGULA—The GOLDEN EYE DUCK.

Tab. xv. Fig. 1, 2.

A. nigro alboque varia, capite tumido violaceo, sinu oris macula alba.

Anas Clangula, *Linn. Syst. Nat.* i. p. 201.—*Ind. Orn.* ii. p. 867.—

Raii Syn. Av. p. 142. A. 8.—*Briff. Orn.* vi. p. 416. t. 37. f. 2.

—*Frisch.* t. 183, 184.

Le Garrot, *Buf. Oïf.* ix. p. 222.—*Pl. Enl.* 802.

Die Quackerente, *Besch. der Berl. Nat. Fr.* iv. p. 599. t. xvii. f. 1, 2.

Golden Eye, *Gen. Syn.* vi. p. 535.—*Br. Zool.* No. 276.—*Will. Orn.* p. 368. t. 73.

In

In the *Golden Eye* the windpipe is of a curious and wonderful structure, for the labyrinth is not only of a different and much more complicated form than any of the foregoing, but a singular enlargement takes place about the middle of the *trachea* itself. This ventricose part consists of divers joints or plaits placed obliquely, and folding over each other so as to admit of its being contracted into a very short compass, or dilated to a great distance, as the lengthening or shortening of the neck may require. In the recent state, these rings are easily, by compression, folded into a space of little more than an inch, and, by drawing out, may be made to occupy the length of four inches, or even longer; and being of a cartilaginous nature, they recover their tone after being drawn out, if left to themselves.

It is manifest that the structure of the *trachea* in this bird being so very unlike that of any other, will ever prevent its being confounded with a different species; and on this account I can with confidence assert, that the *Anas Glaucion* of Linnæus, or *Morillon*, commonly so called, has no existence taking it as a species, for it is merely the *Golden Eye* in incomplete plumage. But this is not the only one known by the name of *Morillon*, for a specimen put into my hands for that bird has proved to be the young of the *Tufted Duck*, and others that of the *Scaup*. Whatever share the structure of this singular kind of *trachea* may have in promoting the loudness of the voice, I will not here insist on; but it is notorious that the cry is heard further off than in many others of the genus.

XXIV. ANAS FUSCA—VELVET DUCK. *Tab. xv. Fig. 3—7.*

A. nigricans, palpebrâ inferiore speculoque alarum albis.

Anas fusca, *Linn. Syst. Nat.* i. p. 196.—*Ind. Orn.* ii. p. 848.—*Raii Syn.* p. 141. A. 4.—*Frisch.* t. 165.

Grande Macreuse, *Buf. Ois.* ix. p. 242.—*Pl. Enl.* 956.

Velvet Duck, *Gen. Syn.* vi. p. 482.—*Br. Zool.* No. 272. t. 96.—*Will. Orn.* p. 363. t. 70.

The *trachea* here is more conspicuous on account of the bony dilatation in the middle of it than for any other circumstance: indeed a manifest difference from any other may be observed just below the *larynx*, being an oblong bony cavity of nearly an inch in length. From this part the *trachea* descends for near two-thirds of its length, when it swells out into a strong bony hollow, flat on one side, and moderately convex on the other, about the size of a small walnut. At the divarication the parts again lose their rings, and become bony, not greatly enlarged, but equally so on both sides—the two *bronchie* taking rise at the under part of this last bony hollow. I have observed some diversity in the *tracheæ* of this species, and in one in particular the hollow round bone was less ossified; besides which, the oblong bone next the *larynx* differed much in being shorter, (Fig. 6.) as also the bony part at the bifurcation of scarcely more than half the dimensions, (Fig. 7.)—which last circumstances taken together seemed to prove its being a young bird.

WE now close the account of such species of the *Duck Tribe* as the males of them have somewhat in the conformation of the *trachea* differing from the other sex; and I flatter myself, that, by means of the preceding descriptions, aided by engravings of the parts in question, the reader will find every thing as clear as was meant to be.

Endeavouring to add to this list, I have examined several others of the Duck genus, as the *Grey Lag*, *White-fronted*, *Bean*, *Bernacle*, *Brent* and *Scoter*; in none of which have I ever found any thing remarkable. — But I mean not to desist from the enquiry, and recommend attention to it by others; for I trust that many singular and curious occurrences will be disclosed on a further investigation of the subject.

W E

WE pass now to the *Merganser* or *Goosander* tribe, in every species of which frequenting this kingdom somewhat occurs worthy of notice.

XXV. *MERGUS SERRATOR*—RED-BREASTED MERGANSER.

Tab. xvi. Fig. 1, 2.

M. crista dependente, pectore rufescente variegato, collari albo.
Mergus Serrator, Linn. *Syst. Nat.* i. p. 208.—*Ind. Orn.* ii. p. 829.
Raii Syn. Av. p. 135. A. 4.—*Bris. Orn.* vi. p. 237. pl. 23.
 Le Harle huppé, *Buf. Ois.* viii. p. 273.—*Pl. Enl.* 207.
 Der Haubentaucher, *Schr. der Berl. Nat. Fr.* iii. p. 374. t. 7. f. 5.
 Meerachen, *Beckst. Vog. Deutsch.* ii. p. 732, Note *.
 Red-breasted Merganser, *Gen. Syn.* vi. p. 423.—*Br. Zool.* No. 261.
 t. 93.—*Will. Orn.* p. 336. t. 64.—*Edw.* t. 95.

The whole of the *Merganser* genus, on outward inspection, seems greatly allied to that of the *Duck*, and to differ chiefly in the bill, which, instead of being flatish, thick, and rounded at the end, is long and narrow, having the edges furnished with numerous sharp processes like the teeth of a saw, which has given rise among sportsmen to the name of *Saw-billed Ducks* or *Divers*. In the *Duck* genus the *trachea* will be found to be more or less composed of gristly rings, approaching indeed in many very nearly to bone, and connected to each other by means of cartilaginous membranes, except in the labyrinthic parts, which are truly bone; but in the *Merganser* tribe the whole seems to be composed of little else than bone, and, in the species now before us, the bony rings or plaits fold over one another in a remarkable manner, as may be seen in the figure. It is in this too, as in the genus of *Duck*, that the singularities observed in the *trachea* are only in the male sex. But, to the point—

The *Red-breasted Merganser* has an enlargement of the *trachea* about the middle of its length, imitating that of the *Golden Eye*, in the same place, but differing, as before observed, in being bony instead of cartilaginous, and the bony plaits of which it consists being most curiously furrowed or channelled transversely: besides this, the lower part of the *trachea* ends in a large and remarkable bony cavity, of an irregular heart shape, with two openings on one side, and one on the other; all of which are covered with fine membranes, in the same manner as before observed in the *Scup*, *Gadwal*, and *Tufted Ducks*: from the bottom of this triangular bony box the two *bronchiæ* arise, and from thence lose themselves in the lungs, as in other subjects.

XXVI. MERGUS MERGANSER—GREATER GOOSANDER.

M. crista longitudinali erectiuscula, pectore albido immaculato, rectricibus cinereis scapo-nigricante.

Mergus Merganser, *Linn. Syst. Nat.* i. p. 208.—*Ind. Orn.* ii. p. 828.

Raii Syn. Av. p. 134. A. 1.—*Bris. Orn.* vi. p. 231. t. 32.

Le Harle, *Buf. Ois.* viii. p. 267. t. 23.—*Pl. Enl.* 951.

Tauchergans, *Besch. der Berl. Nat. Fr.* iv. p. 594. t. 18. f. 3.—

Beckst. Vög. Deutsch. ii. p. 724. Note *.

Merganser or Goosander, *Gen. Syn.* vi. p. 418.—*Br. Zool.* No. 260.

t. 92. f. 1.—*Wdl. Orn.* p. 335. t. 64.

A sufficient idea of the *trachea* of this species may be formed by a comparison with that of the foregoing. In respect to the large bony case at the bottom, it is greatly similar; but the upper part of the *trachea* differs in having two enlargements instead of one: the first placed about one third from the *glottis*, or entrance at the top; the second nearly midway between the first and the bottom. This

is figured, among others, in the *Berlin Transactions*, by Dr. Bloch, as above referred to in the Synonyms.

From the scarcity of the *Merganser* tribe in this kingdom, sufficient opportunities rarely occur to enable us to ascertain many points about them as might be wished for. I am, however, now inclined to believe, as hinted in another place*, that the *Goosander* and *Dun Diver* form but one species, and that the former is the *male* bird. What has, I believe, led us hitherto to suppose otherwise, is the custom of this species of the two sexes separating after breeding time; the *old males* associating together in one flock, and the *females*, with the *young birds* without discrimination, forming a separate company; sufficiently accounting for the flocks of these latter being most numerous: from this cause, and the plumage of the *male* being for a certain season not unlike that of the *female*, and especially dissection proving that many males are always among them, the wonder ceases that the birds in question should have been set down by many writers for different species.

In *Germany* these birds are sufficiently plentiful, and the ornithologists of that country have written much concerning them; the result of which is, that the *Merganser* is considered by them as the *male*, and the *Dun Diver* the *female*, and the *Castor* of Linnæus not at all distinct, nor otherwise than the young bird. It would take up too much room here, in this Essay already sufficiently long, to detail what Dr. Pallas †, Professor Beckmann ‡, and Dr. Otto §, have said on this subject in the *Berlin Transactions*; but I should not do these Gentlemen justice, did I not recommend the perusal of their various Dissertations, which may be read with equal pleasure and advantage.

* *Gen. Syn.* vi. p. 423.

† *Besch. der Berl. Nat. Fr.* i. p. 170.

‡ *Besch. der Berl. Nat. Fr.* ii. p. 551.

§ *Id.* iii. p. 456.

XXVII. MERGUS ALBELLUS—The SMEW. *Tab. xvi. Fig. 3, 4*

M. crista dependente, occipite nigro, corpore albo, dorso temporibusque nigris.

Mergus Albellus, *Linn. Syst. Nat.* i. p. 209.—*Ind. Orn.* ii. p. 831.

Raii Syn. Av. p. 135. A. 3.—*Bris. Orn.* vi. p. 245. t. 24. f. 1.

Petit Harle huppé, La Piette, *Buf. Ois.* viii. p. 271. pl. 24.—

Pl. Enl. 449.

Die weisse Nonne, *Besch. der Berl. Nat. Fr.* iv. p. 596. t. 18. f. 7.

Die weisse Tauchente, *Beckst. Vog. Deutsch.* ii. p. 738.

Smew or White Nun, *Gen. Syn.* vi. p. 428.—*Br. Zool.* No. 262.—

Will. Orn. p. 255. t. 64.

This beautiful bird is considerably smaller than the two last described, and the authors above referred to will point it out should any one be ignorant of the species. The size of the *trachea* is smallest near the upper part, but enlarges as it approaches towards the middle; from whence to the bottom part it continues of nearly equal dimensions, the texture consisting of bony rings, with scarcely any cartilage appearing to intervene. At the bottom part is a bony cavity as in the others, but of a different form, being much smaller in proportion, and differing in shape, the greater expanse being from side to side, whereas in the others it is almost upwards and downwards: on one side is a round hole covered by a drum-like membrane, and on the opposite an oval smooth hollow bone uniting with it; from the bottom of these arise the *bronchiæ*.

In this, as in the former, two species have been created out of one, and owing precisely to the same cause; which is, that of the young male having the female plumage for some length of time after growing to size. I have detected this some time since by the laby-

rinth of the supposed *male* of the *Mergus minutus* of Linnæus being in all respects similar to that of the *Male Snipe*, added to the assurance of some later writers, who have likewise ascertained the fact, and penned their thoughts on the subject. It therefore may be concluded that we have no more than three distinct species of *Merganser* which migrate into this country.

THERE are several other birds, besides the above, concerning which I fear we shall hereafter find ourselves mistaken ; but this is not the place for such investigation. The great increase in number of Gentlemen who make Natural History their study, will no doubt greatly contribute to detect many errors which have hitherto been received as facts for want of due enquiry.

EXPLANATION OF THE PLATES.

TAB. IX.

- Fig. 1. The *trachea* or windpipe of the *Wood Grouse*, or *Cock of the Wood*, with its several appendages.—*a.* the tongue ; *b b.* the *os hyoides*, or tongue bone, with its parts ; *c.* the *larynx*, with the orifice therein for the admission of air ; *dd.* muscles which accompany the windpipe, one on each side ; *e e e.* the *trachea*.
2. The *Marail Turkey*, serving to shew the circumstance of the *trachea* rising above the flesh on the breast before it goes to the lungs.
3. The *Parrake Pheasant*, in which the same singularity is observed in respect to the *trachea*, but in a greater degree, running down the breast the greater part of its length.

TAB.

TAB. X.

- Fig. 1. The *Guan*—In this the *trachea* is much more elongated than in either of the foregoing, infomuch as to double upwards in a remarkable manner.
2. Part of the windpipe of the *Indian Cock* :—*a a.* the two *bronchiæ*, or lung-pipes.
 3. A figure of the same taken from a different subject, serving to shew how this part appears in some specimens.
 4. The *trachea* of the *Numidian Crane*, or *Demoiselle*.

TAB. XI.

Two views of *Cushew Curaffow*.

- Fig. 1. A side view of the parts as they appear on dissection :—
a. pectoralis minor muscle; *b.* its tendon; *c.* the sternum; *d.* pectoralis major muscle; *e.* the clavicle; *f.* the *glottis*; *g.* the *trachea* descending; *h.* the part where it begins to form the convolutions; *i.* the convolutions; *k.* the *trachea* where it dips into the thorax; *l.* strong elastic fibres continued almost the whole length of the *trachea*, which has a fleshy origin in the thorax (see *o.* fig. 2); *m.* the part which answers the same office as the ribs in other animals; *n.* muscles terminating in fascia.
2. The parts seen in a nearly opposite situation :—*a.* pectoralis minor; *c.* the sternum; *d.* pectoralis major; *e.* the clavicle; *g.* the descending part of the *trachea*; *h.* the part where it begins to form the convolutions; *i.* the convolutions; *k.* the part where it has entered the thorax; *l.* the fibres which are continued from *o.* where they are fleshy; *m.* the parts which answer to the ribs; *n.* a muscle terminating in fascia;

fascia; *o.* the muscle (one on each side), which assists in respiration and in straitening the *trachea*.

TAB. XII.

- Fig. 1. The sternum or breast-bone of the *Wild Swan*, with the *trachea* in its proper situation.—The outer part of one side of the keel is taken off, in order the better to expose the internal contents to view.
2. The sternum with the keel seen in front, serving to shew the opening into which the *trachea* enters and returns.
 3. A similar view of the same parts in the *Tame Swan*.
 4. A view of the sternum of the *Crane*, with the *trachea* in situ, —part of the keel taken away as in fig. 1.

TAB. XIII.

- Fig. 1. The *trachea* of the *Teal*, the whole of its length
2. The *trachea* of the *Garganey*.
 3. An opposite view of the same:—*a a.* two muscles, placed one on each side the labyrinth, very conspicuous while recent.
 4. The *trachea* of the *Shoveler*.
 5. The same seen in an opposite direction.
 6. The lower part of the *trachea* of the *Pintail*.
 7. Ditto of the *Gadwall*.
 8. The last shown on the opposite side.
 9. The *trachea* of the *Widgeon*.
 10. Ditto of the *Mallard*.

TAB. XIV.

- Fig. 1. The *trachea* of the young *Moskovy Duck*. (See that of the old one in TAB. XVI. f. 5, 6.)
2. The same seen on the other side.

Fig. 3.

Fig. 3. The *trachea* of the *Scaup Duck*.

4. The opposite side of the same:—*aa.* an oblique muscle serving to unite the base of the *bronchiæ* or lung-pipes, and may be traced in most subjects whilst recent.
5. *Trachea* of the *Pochard*.
6. The same in an opposite direction.

TAB. XV.

Fig. 1, 2. Two views of the windpipe of the *Golden Eye*.

3. *Trachea* of the *Velvet Duck*.
4. The bony case of the last below the *larynx*, seen on the opposite side.
5. An opposite view of the bony hollow of the middle part.
6. View of the uppermost bony case taken from a different subject, serving to shew how this part appears in some specimens.
7. View of the bottom part of the same *trachea*.
8. *Trachea* of the *Shieldrake*.
9. View of the same, seen on the opposite side.

TAB. XVI.

Fig. 1. *Trachea* of the *Red-breasted Merganser*.

2. Ditto seen in the opposite direction.
3. *Trachea* of the *Smew*.
4. An opposite view of the same.
5. The *trachea* of an *Old Muscovy Duck*. (See that of a younger one in TAB. XIV. f. 1, 2.)
6. The same seen on the other side.